FIG. 1

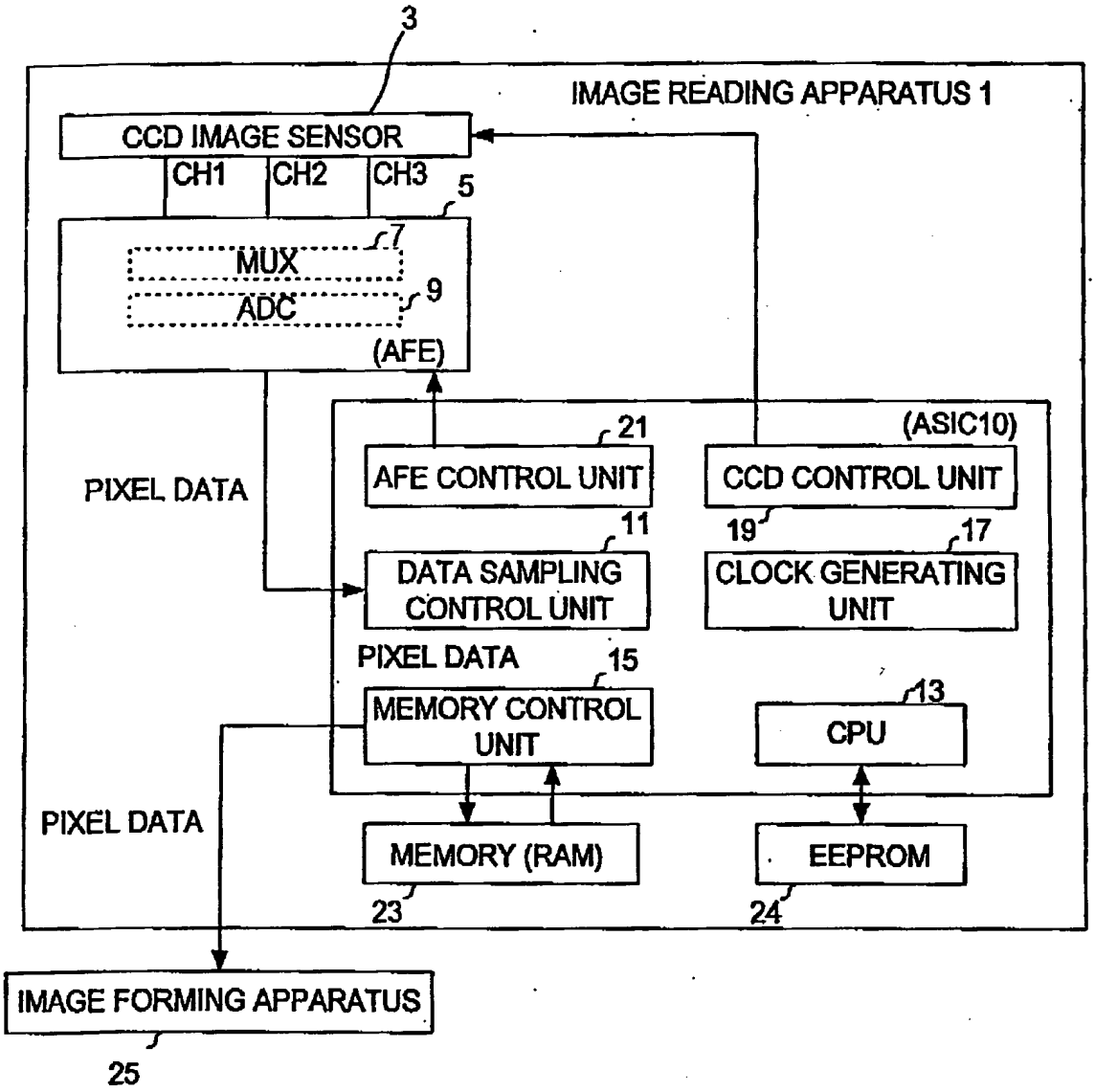

3
IMAGE READING APPARATUS 1
CCD IMAGE SENSOR
CH1
CH2
CH3
5
7
MUX
9
ADC
(AFE)
(ASIC10)
21
AFE CONTROL UNIT
CCD CONTROL UNIT
PIXEL DATA
11
19
17
DATA SAMPLING CONTROL UNIT
CLOCK GENERATING UNIT
PIXEL DATA
15
13
MEMORY CONTROL UNIT
CPU
PIXEL DATA
MEMORY (RAM)
EEPROM
23
24
IMAGE FORMING APPARATUS
25

FIG. 2

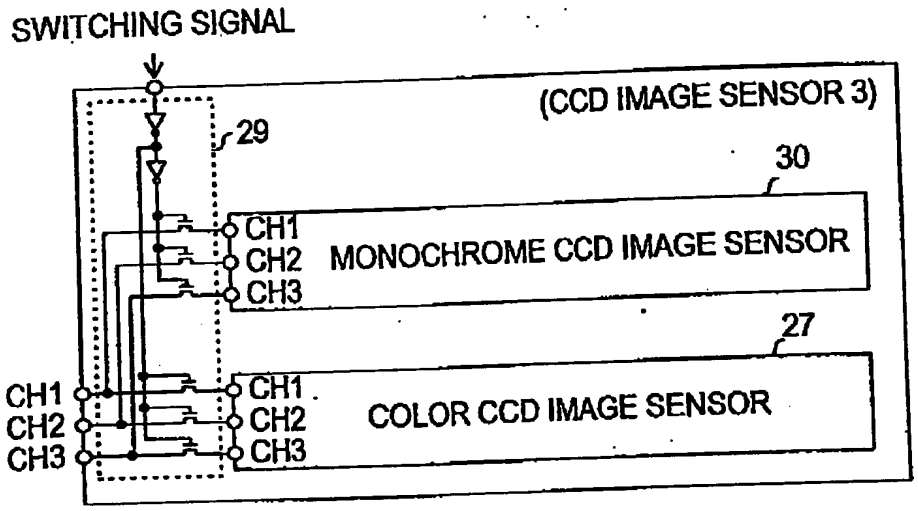

SWITCHING SIGNAL
(CCD IMAGE SENSOR 3)
29
30
CH1
CH2
CH3
MONOCHROME CCD IMAGE SENSOR
27
CH1
CH2
CH3
CH1
CH2
CH3
COLOR CCD IMAGE SENSOR

FIG. 3

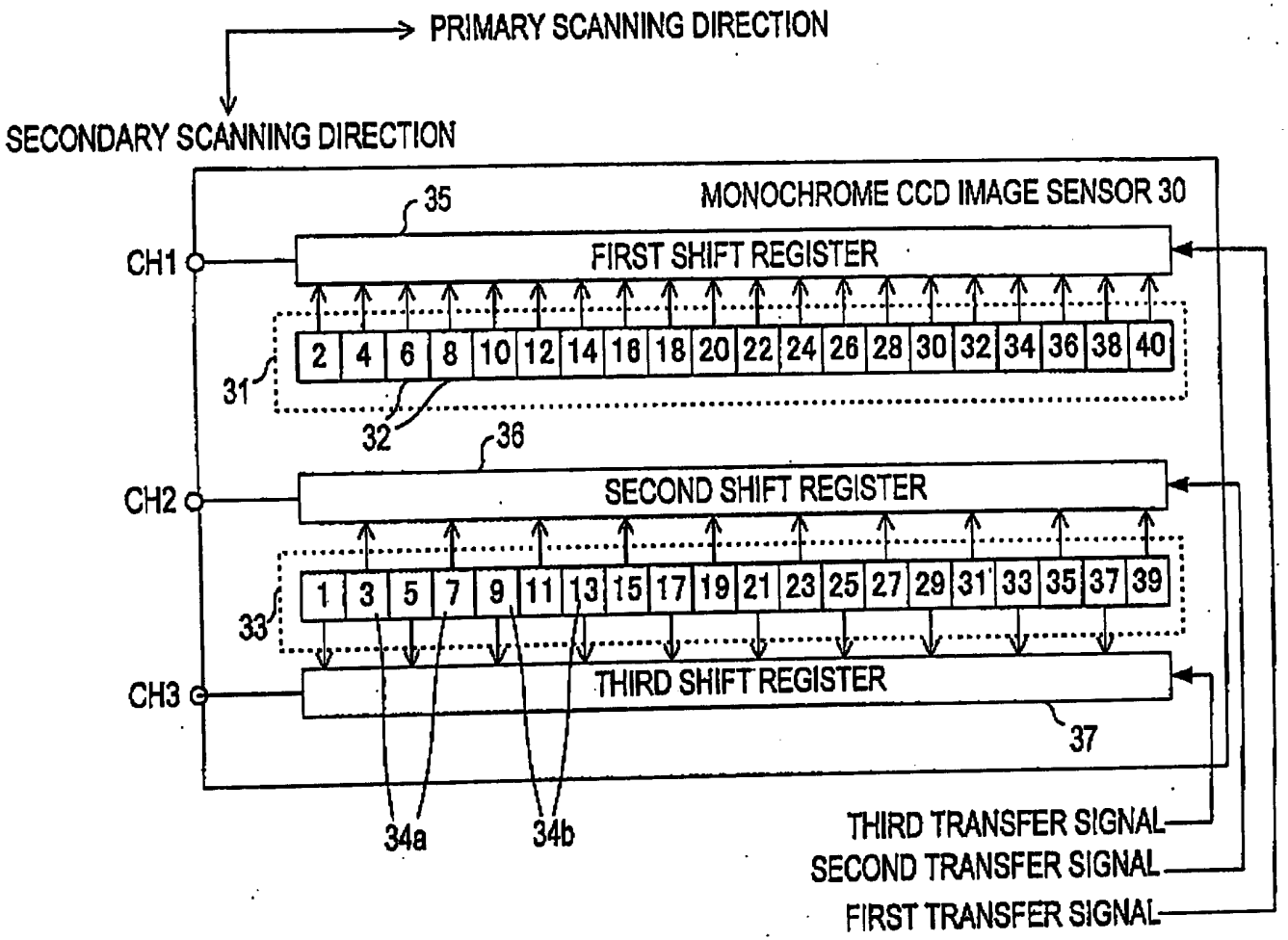

PRIMARY SCANNING DIRECTION
SECONDARY SCANNING DIRECTION
MONOCHROME CCD IMAGE SENSOR 30
35
CH1
FIRST SHIFT REGISTER
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
31
32
36
CH2
SECOND SHIFT REGISTER
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
33
CH3
THIRD SHIFT REGISTER
37
34a
34b
THIRD TRANSFER SIGNAL
SECOND TRANSFER SIGNAL
FIRST TRANSFER SIGNAL

FIG. 4

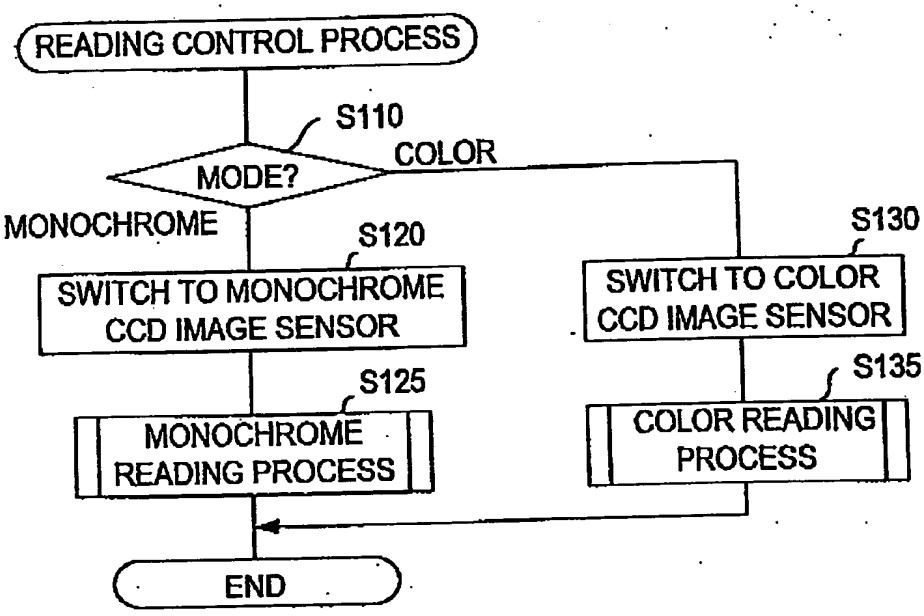

READING CONTROL PROCESS
S110
MODE?
COLOR
MONOCHROME
S120
SWITCH TO MONOCHROME CCD IMAGE SENSOR
S125
MONOCHROME READING PROCESS
S130
SWITCH TO COLOR CCD IMAGE SENSOR
S135
COLOR READING PROCESS
END

FIG. 5

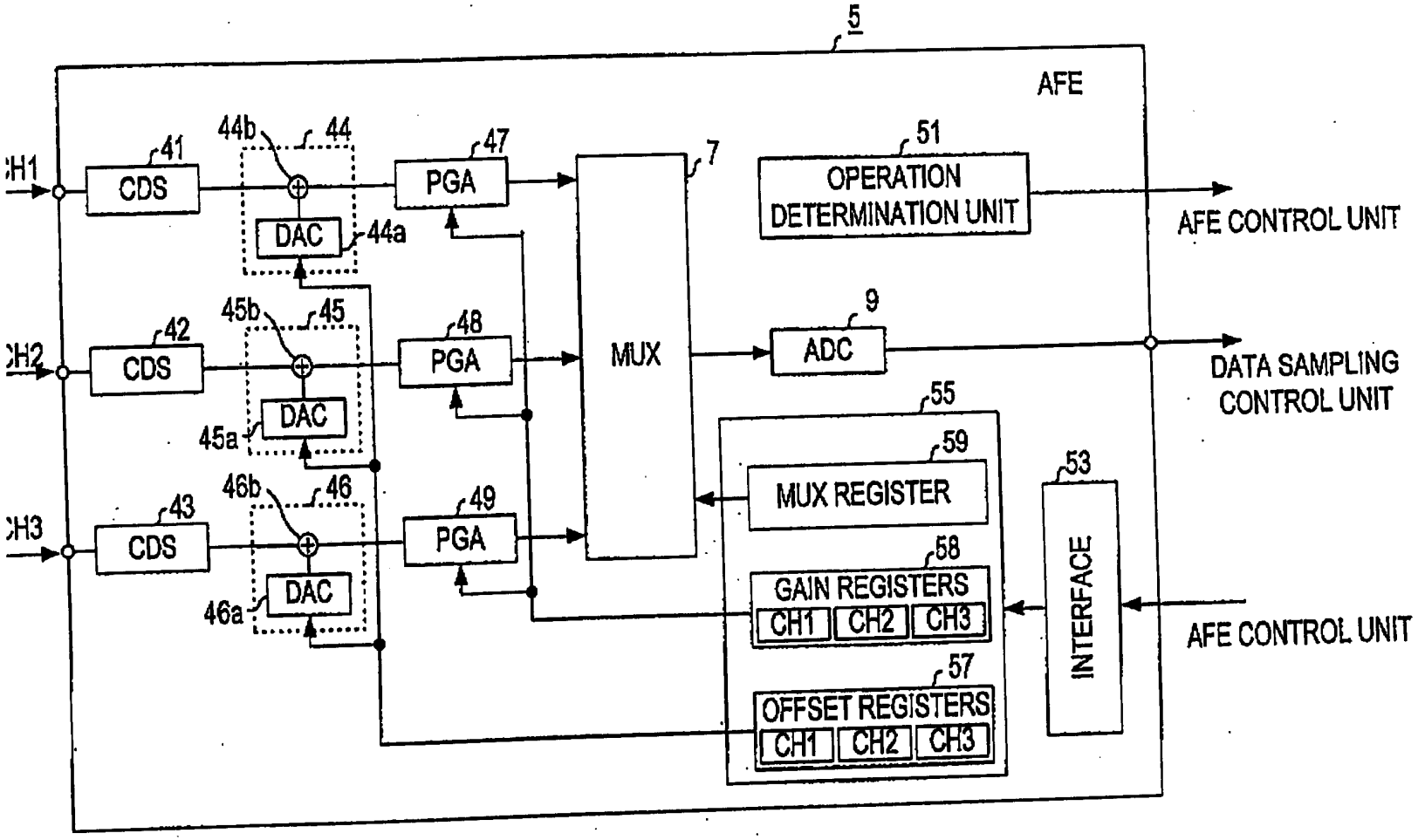

5
AFE
CH1
41
CDS
44b
44
DAC
44a
47
PGA
7
51
OPERATION DETERMINATION UNIT
AFE CONTROL UNIT
CH2
42
CDS
45b
45
DAC
45a
48
PGA
MUX
9
ADC
DATA SAMPLING CONTROL UNIT
CH3
43
CDS
46b
46
DAC
46a
49
PGA
55
59
MUX REGISTER
53
58
GAIN REGISTERS
CH1 CH2 CH3
INTERFACE
AFE CONTROL UNIT
57
OFFSET REGISTERS
CH1 CH2 CH3

FIG. 6

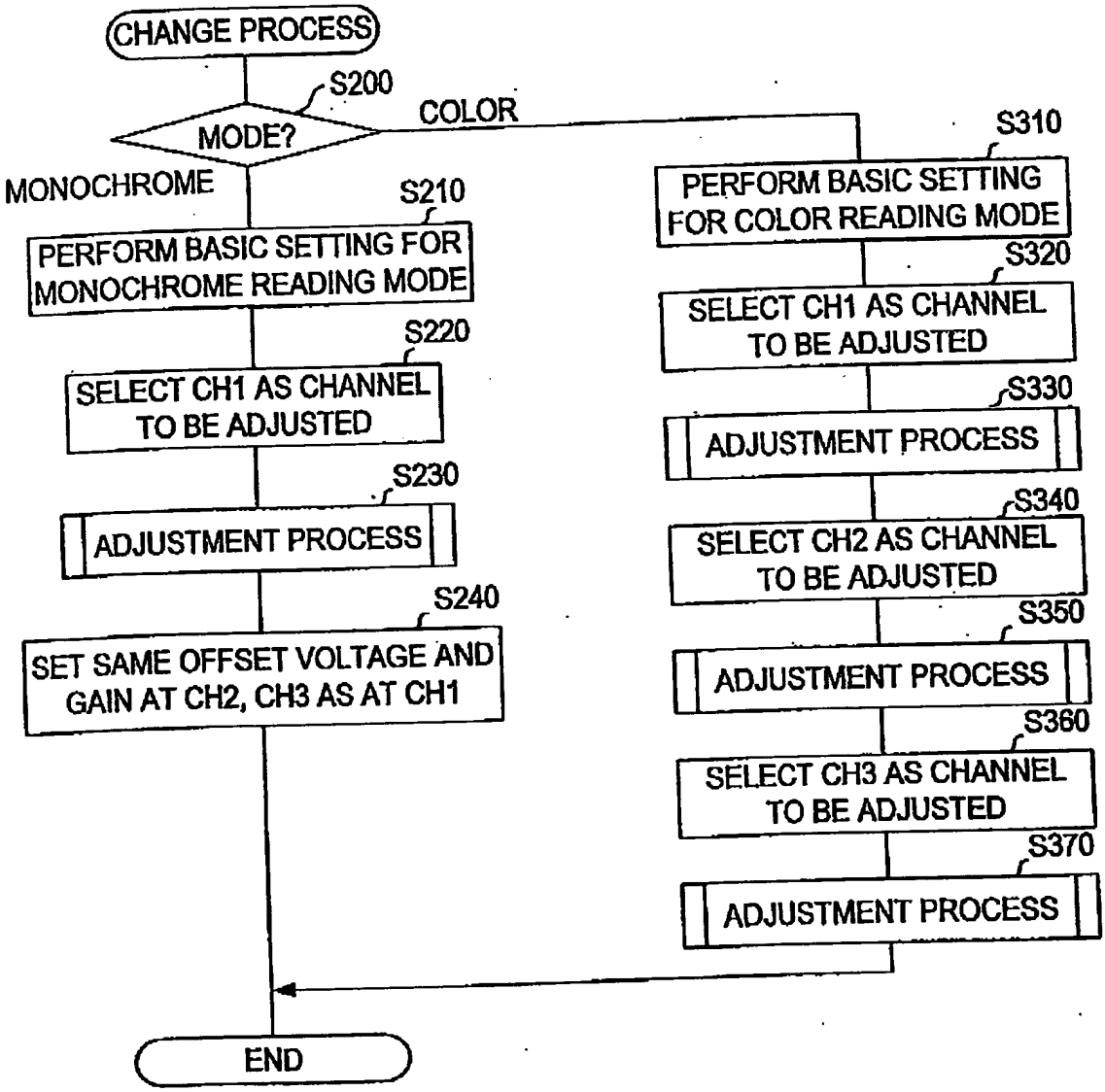

CHANGE PROCESS
S200
MODE?
COLOR
MONOCHROME
S210
PERFORM BASIC SETTING FOR MONOCHROME READING MODE
S220
SELECT CH1 AS CHANNEL TO BE ADJUSTED
S230
ADJUSTMENT PROCESS
S240
SET SAME OFFSET VOLTAGE AND GAIN AT CH2, CH3 AS AT CH1
S310
PERFORM BASIC SETTING FOR COLOR READING MODE
S320
SELECT CH1 AS CHANNEL TO BE ADJUSTED
S330
ADJUSTMENT PROCESS
S340
SELECT CH2 AS CHANNEL TO BE ADJUSTED
S350
ADJUSTMENT PROCESS
S360
SELECT CH3 AS CHANNEL TO BE ADJUSTED
S370
ADJUSTMENT PROCESS
END

FIG. 7

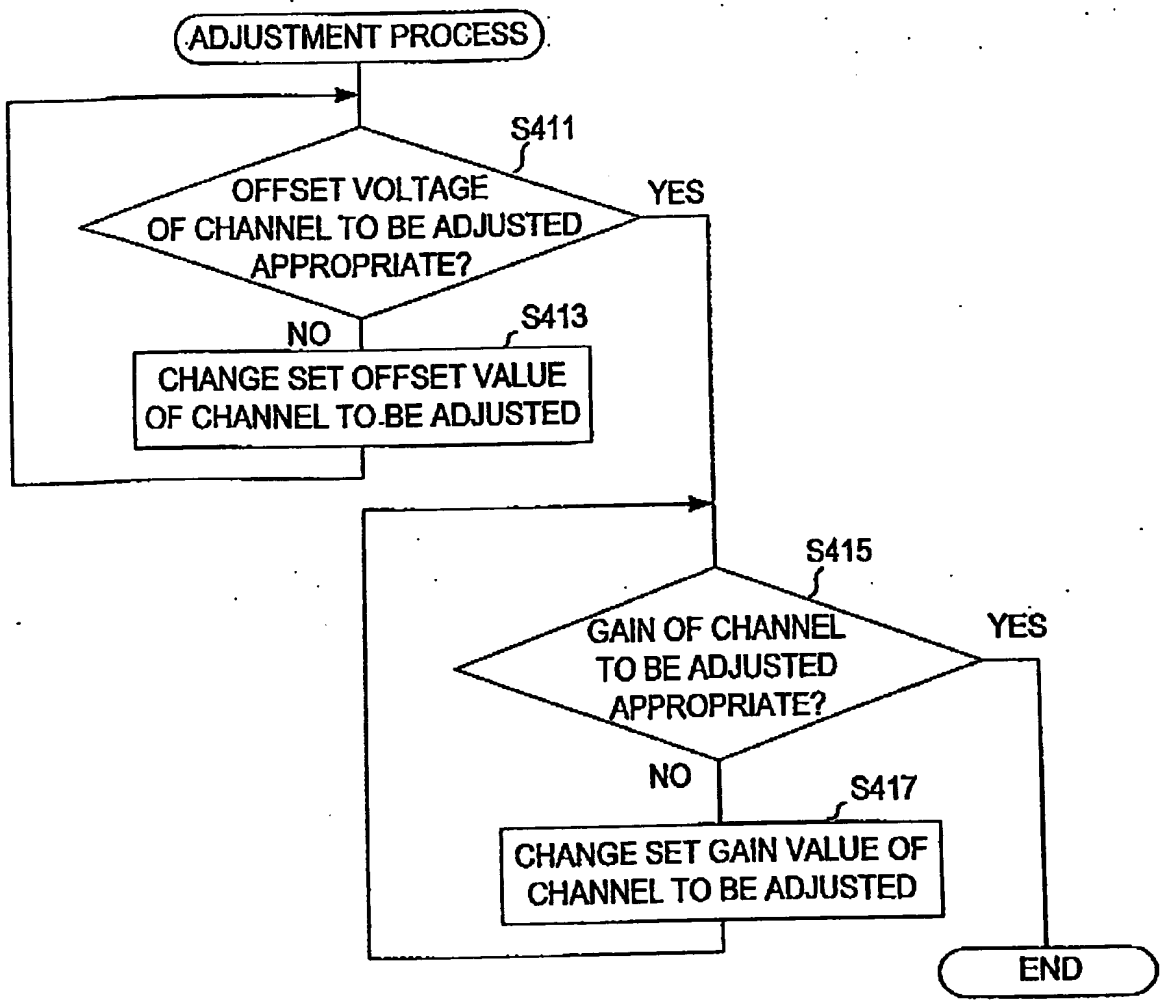

ADJUSTMENT PROCESS
S411
OFFSET VOLTAGE OF CHANNEL TO BE ADJUSTED APPROPRIATE?
YES
NO
S413
CHANGE SET OFFSET VALUE OF CHANNEL TO BE ADJUSTED
S415
GAIN OF CHANNEL TO BE ADJUSTED APPROPRIATE?
YES
NO
S417
CHANGE SET GAIN VALUE OF CHANNEL TO BE ADJUSTED
END

FIG.8

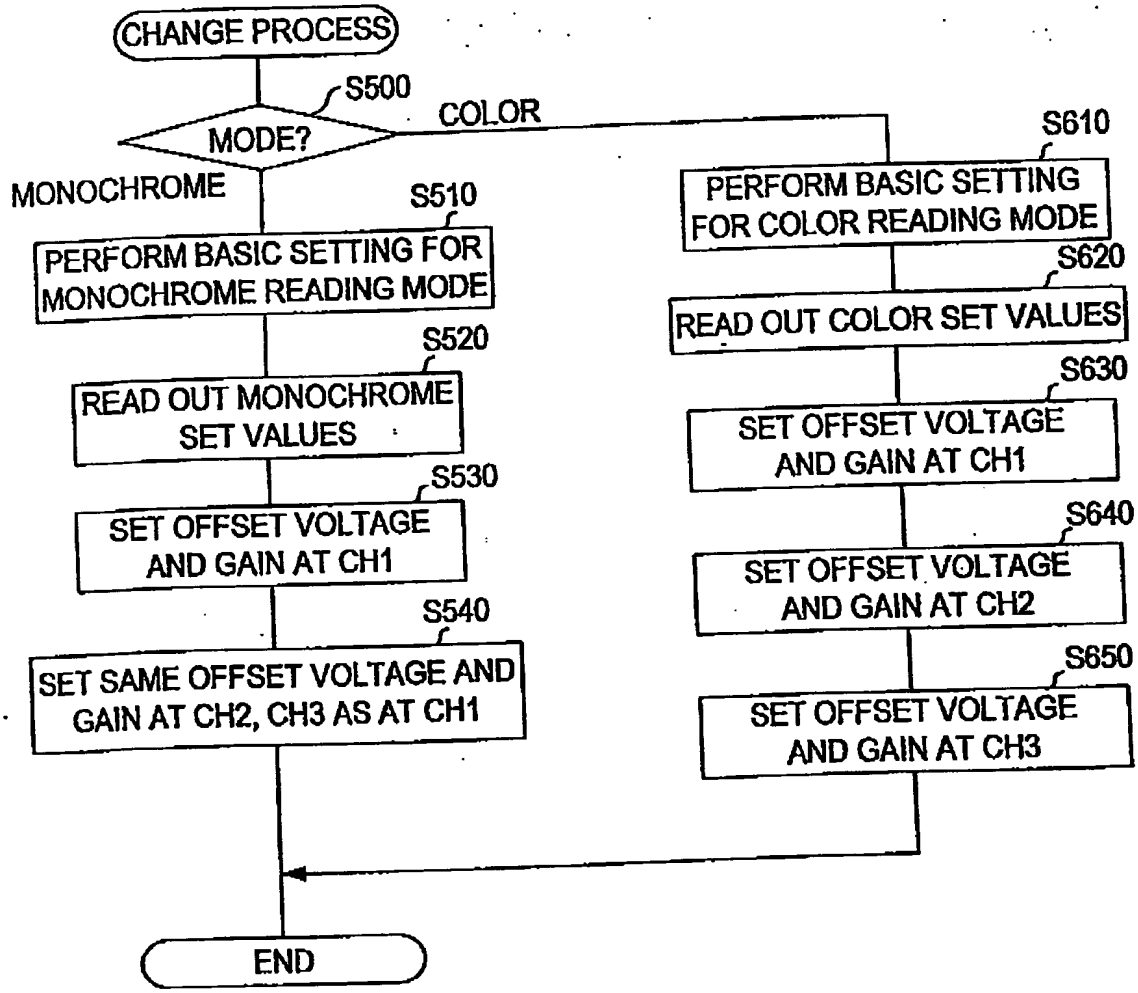
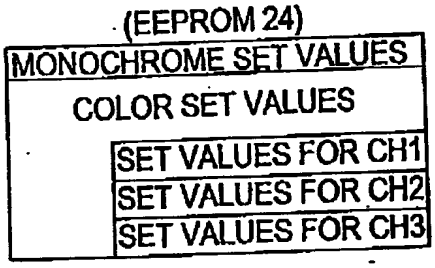

CHANGE PROCESS
S500
MODE?
COLOR
MONOCHROME
S510
PERFORM BASIC SETTING FOR MONOCHROME READING MODE
S520
READ OUT MONOCHROME SET VALUES
S530
SET OFFSET VOLTAGE AND GAIN AT CH1
S540
SET SAME OFFSET VOLTAGE AND GAIN AT CH2, CH3 AS AT CH1
S610
PERFORM BASIC SETTING FOR COLOR READING MODE
S620
READ OUT COLOR SET VALUES
S630
SET OFFSET VOLTAGE AND GAIN AT CH1
S640
SET OFFSET VOLTAGE AND GAIN AT CH2
S650
SET OFFSET VOLTAGE AND GAIN AT CH3
END

FIG. 9


(EEPROM 24)
MONOCHROME SET VALUES
COLOR SET VALUES
SET VALUES FOR CH1
SET VALUES FOR CH2
SET VALUES FOR CH3